Neither sex of *H. crosbyi* drummed; the male crawled onto the female, assuming a typical superposition, then curved his abdomen around either the left or right side to engage the female subgenital plate with his genital hooks. The subgenital plate was pulled down and action by the accessory external genitalia, primarily the epiproct, resulted in formation of a depression or "sperm pocket" beneath it. Then followed a spontaneous eversion of the membranous male aedeagus, transfer of the sperm mass to the pre-formed "pocket," retraction of the aedeagus, and finally a curious tapping or brushing action by the male cerci on the female cerci. The latter served as a releaser for initiating telescoping contractions of the apical female abdominal segments, resulting in sperm aspiration. Sperm transfer was therefore external, with no copulation. All three species were polygamous.

AN EMERGENCE SEQUENCE OF CHLOROPERLIDAE IN A NORTHEASTERN OHIO STREAM.

BY MARTIN A. TKAC, JR., *Department of Biological Sciences, Kent State University, Kent, Ohio.*

The family Chloroperlidae is well represented in a small isolated stream habitat in northeastern Ohio. This stream flows through a unique, vertical-walled habitat within a dense mixed forest of northern hardwoods and hemlock. The gorge, Stebbins Gulch, has been incised into sandstones and shales to a depth in excess of three hundred feet, creating a relict habitat that is quite different from other stream habitats in northeastern Ohio.

Chloroperlidae present in this stream habitat include three genera and some five species. The species present and emergent periods are: *Alloperla caudata* Frison, May 27–July 29; *A. chloris* Frison, June 18–August 24; *A. imbecilla* (Say), May 20–June 4; *Hastaperla brevis* (Banks), May 20–July 1; and *Sweltsa onkos* (Ricker), May 20-June 18. Thus emergence commences with three species representing all three genera present in the area by May 20 and continues uninterruptedly until as late as August 24, with *Alloperla chloris* terminating the emergence of the family from the stream.

EMERGENCE PATTERNS IN PLECOPTERA.

BY PETER P. HARPER, *Département des Sciences Biologiques, Université de Montréal, Québec, Canada.*

Emergence patterns in Plecoptera are discussed on the basis of data collected in 1972–1974 on the L'Achigan River in Quebec. Fifty emergence trap series were analysed from twenty-eight sites on the mainstream and from seventeen sites on six tributary streams.

Because of the relatively long adult life span of stoneflies, only data from emergence traps (or other means of collecting teneral adults) can be used to draw emergence patterns. General collecting and light-trap catches provide a biased picture of the emergence.

Emergence sequence indicates some temporal spacing between species, but closely related species often emerge at the same time and in the same places.

Emergence patterns for a given species are similar from year to year; the differences observed seem to be related to particular climatic conditions.

The emergence is alike in adjacent sites and is affected in a similar manner by the short-term climatic variations.

Two types of patterns can be distinguished, viz a short synchronous emergence and a longer gradual emergence. Though these are often easily separable, it is not yet clear whether they represent a basic characteristic of the species concerned or whether they are imposed by local climatic conditions. More data from various climatic regions is needed before this can be determined.

The numbers of species and specimens collected in the traps vary considerably from site to site and from year to year; this is probably explained by the great heterogeneity of the stream studied.

THE STRUCTURE (ULTRA) AND FUNCTION OF THE VENTRAL LOBE AND THE HAMMER OF PLECOPTERA.

BY RAINER RUPPRECHT, *Zoological Institute, Johannes Gutenberg University, Mainz, Germany.*

The fine structure of the vesicle of *Leuctra* and *Capnia* and of the hammer of *Isoperla* are described. There are bristles on the vesicle and beyond the edge of the hammer, which are innervated by a single bipolar sensory cell. The existence of a tubular body in the outer dendritic segment shows that this hair is mechano-receptive. The functions of these organs are understood by observation during use and by elimination of the hair on these organs. The vesicle (or ventral lobe) is a sternal protrusion covered with hair, giving the animal a feedback that it has touched the ground, and permitting it to conrol the drumming position. It is a tactile organ. The hammer is a protrusion or extension of one or more sterna (7 to 9), which is used for tapping. It is covered by hair which has the same function as the hair on the vesicle. The hammer is a tapping organ.

THE STONEFLIES (PLECOPTERA) OF THE ROCKY MOUNTAINS.

BY ARDEN R. GAUFIN, *Department of Biology, University of Utah, Salt Lake City, Utah.*

During the last 20 years the author and his associates at the University of Utah, and University of Montana Biological Station have conducted